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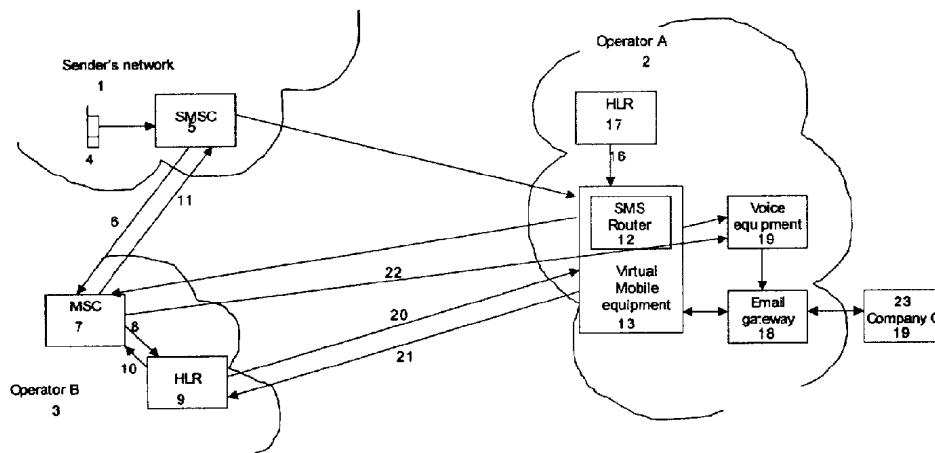
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(57) Telecommunications services apparatus is operable to associate an email address with a mobile telephony address that is a virtual mobile address. Virtual mobile equipment 13 including an SMS router 12 enables a voice call from a caller to a mobile telephony address to be recorded and delivered as an email attachment to the associated email address. Alternatively, a caller making a voice call can enter DTMF tones that are recognised, collected and converted to an email message that is delivered by email to the same email address. Further, a text message directed to the mobile telephony address can be converted into email form and delivered by email to the same email address.



### Figure 1

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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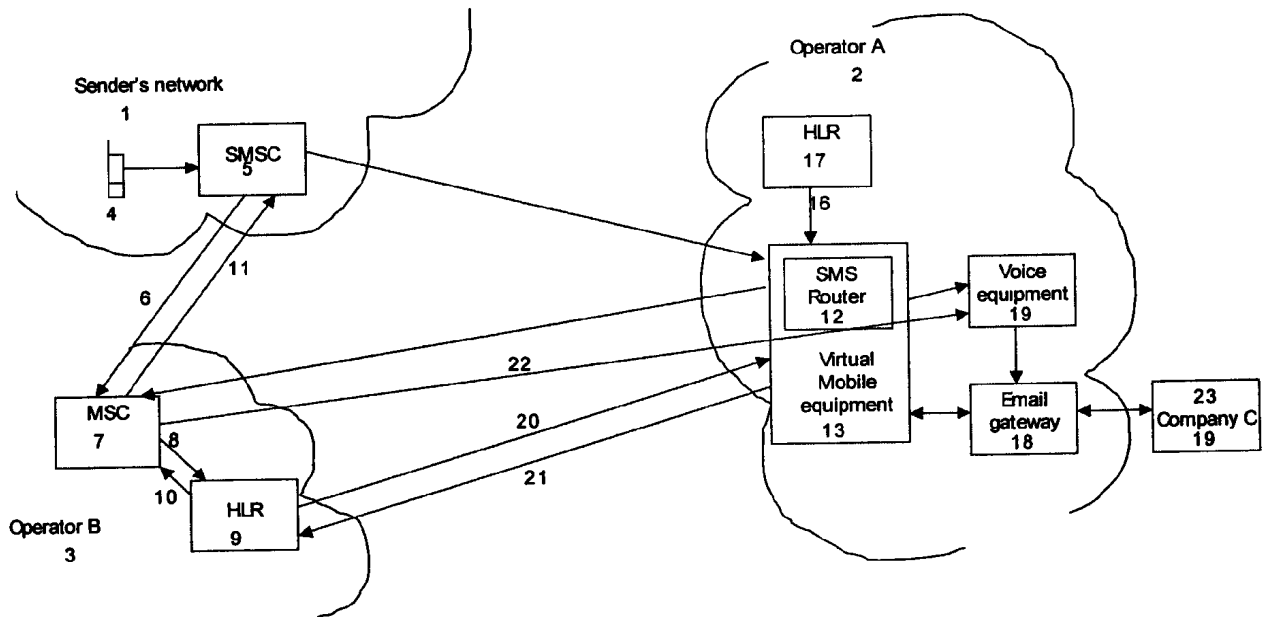


Figure 1

TELECOMMUNICATIONS SERVICES APPARATUS

This invention concerns the field of Telecommunications and in particular the field of fixed and mobile telecommunications including but not limited to GSM.

5

It is customary in mobile telephony implementations for the same telephone number (e.g. an MSISDN telephone number) to be usable as an address for both voice calls and text messages, and it is also common that in the event of unsuccessful voice connection means are provided for a voice message to be left.

10

Surprisingly in the standard GSM specifications, if you want to use a mobile telephone number as a host address, it only supports on-net access, and therefore various solutions have been proposed for all-net access. This has led to a technique commonly known as Virtual Mobile. Virtual Mobile allows text messages addressed to host equipment in a network A to be sent from any network.

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Virtual Mobile works by providing a Home Location register (HLR) function for a virtual telephone number, i.e. one that is not necessarily associated with a real physical telephone terminal. The standard routing operations of GSM deliver a call or message to the correct network node by querying the HLR in order to determine the location of a telephone. By arranging for the HLR to respond to queries relating to Virtual Mobile numbers by returning the address of a network node designated for handling Virtual Mobile calls or messages, access to this network node becomes possible from any network.

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Virtual Mobile systems to date have been focussed on text connectivity although the technique of voice call re-direction is known. Voice call re-direction allows a normal voice telephone call to be made to a Virtual Mobile number. However the current position of such re-direction techniques is that a voice call is normally redirected to either another telephone for personal answering or, in some cases, is directed to a

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voice announcement system, which for example may explain the service and prompt the caller to send a text to the Virtual Mobile number to use the service.

5 It is common at the moment for text messages to be delivered to terminating hosts over IP networks using SMSC based protocols, although some companies such as Telsis offer email delivery to hosts over the public Internet.

10 At the same time as these technical developments have been taking place, a change in users' behaviour has also occurred whereby mobile phone users will typically call or text to a mobile telephone number depending on their personality, mood and circumstances of the moment. The characteristics of text and voice messages are different and each is suited to its own types of communication.

15 The present invention hugely improves the utility of third party connectivity by allowing a telephone user to call (i.e. voice) or text a message to a virtual mobile number allowing both to be delivered by email over an Internet. There is therefore a simple interface for the user, i.e. they simply call or text to a telephone number associated with an organisation, product etc. and there is also a simple set up means for the organisation, or possibly the individual, to acquire a Virtual Mobile telephone number, which they may then use for receiving voice or text messages via email.

25 The present invention allows an email address to be associated with a Virtual Mobile number, and for either a voice call or a text message that has been directed to the Virtual Mobile number to be delivered by email to the associated email address, respectively as a voice message attachment or a representation of the text message.

30 Furthermore it is disclosed that the apparatus may be used to detect DTMF tones, such as may sent from a user's telephone keypad, during a voice call. In this way it may be arranged that the caller may interact with the apparatus during a voice call, preferably with the assistance of voice prompts or other techniques, thereby registering one or more DTMF digits in the apparatus. These digits may then be converted into a message in an email format by the apparatus and delivered to the associated email

address, in the same way as for a text message. Using this technique, both SMS messages and Voice calls with DTMF may be arranged to deliver emails in substantially identical format, that may then be collectively counted, categorised or otherwise processed by the email recipient, without regard for whether the caller used  
5 text or voice communication.

Recognising that voice and text communication are each more suited to differing circumstances, a potential sender may therefore be more likely to send a message if both means are always available since he can at any time choose the more appropriate  
10 means of communication. Furthermore, offering both methods on the same number makes the situation simpler for the user and reduces barriers to communication. The present invention allows both individuals and organisations to associate an email address with a Virtual Mobile telephony address, this address being usable as a single contact address for receiving voice, DTMF and text communication, the resultant  
15 communication being delivered by email.

It is also possible to further extend the utility of the invention by optionally allowing voice calls to be delivered directly at certain times, for example to an agent or switchboard during office hours, and to utilise a means for recording voice messages  
20 to be delivered to an email address at other times. Alternatively the collection of DTMF digits may be allowed or disallowed according to the time of a call, for example for the purpose of implementing the start and end of a competition.

According to the invention there is provided a telecommunications services apparatus  
25 for use with a telecommunications system, the apparatus being operable to associate an email address with a mobile telephony address, and the apparatus providing means to allow a caller making a voice call to this address to record a message that is delivered as an email attachment to the associated email address, or to allow a caller making a voice call to enter DTMF tones that are recognised and collected and converted to an  
30 email message that is delivered by email to the same email address or further for a text message directed to the mobile telephony address to be delivered by email to the same email address, wherein the mobile telephony address is a Virtual Mobile address.

The Virtual Mobile function that is utilised by the invention may operate in network A utilising solely MSISDN numbers taken from network A's allocated number ranges. In this case a network B has no involvement in the operation of the invention. Optionally,  
5 the Virtual Mobile function may also operate using MSISDN numbers taken from a network B's allocated number ranges. In this latter case, network A is also providing a Virtual Mobile service on behalf of network B. Since this is the more general case, the invention is now described on the basis of the two networks A and B. The former case is also covered in the following description by taking network A and network B to be  
10 the same network.

The known Location Update method for implementing Virtual Mobile is used in this example since it is more appropriate for the case where networks A and B are different networks. However if network A and B are the same network then the known Internal  
15 HLR method or another method may be used instead.

Mobile telephone networks including a sender's network (1), a network A (2) and a network B (3) are interconnected. A and B may or may not be the same network, and the sender's network may be any network including A or B. A recipient company or  
20 organisation C (23) is connected via the public Internet to an email gateway (18) attached to network A.

Network A operates a Virtual Mobile equipment (13), which preferably contains at least one SMS Router (12) as a destination for certain Virtual Mobile numbers, one or  
25 more of which numbers are allocated to services on behalf of network B and other numbers are allocated to services for network A, where these services make use of the present invention and deliver voice and text messages by email.

The Virtual Mobile equipment (13) periodically generates MAP-LOCATION-  
30 UPDATE messages for the certain MSISDNs that are associated with network B, and these update network B's HLR (9) to indicate that the location of the Virtual Mobiles is the SMS Router (12).

When a user (4) sends a text message to one of the Virtual Mobile numbers associated with network B, his SMSC (5) sends an SRI-SM query (6, 8) that is routed by GSM networks via MSC (7) to network B's HLR (9). The response to this query (10,11) directs the SMSC (5) to deliver the message to the SMS Router (12). The Virtual Mobile equipment (13) may then determine that the Virtual Mobile number used is associated with network B, and convert the message to an email format and deliver it via an email gateway (18). For voice calls from the user (4), network B's HLR sends an MAP-PROVIDE ROAMING NUMBER query (20) to network A's SMS Router and obtains a routing response (21) directing network B to deliver the call (22) to the Voice equipment (19) in network A, which may record a message and /or collect DTMF tones and then convert the message to an email format and deliver it via the email gateway (18).

The Virtual Mobile (Virtual Mobile) equipment in a preferred embodiment may be implemented on one or more SMS Routers in network A. Using techniques known in the art and described above, the Virtual Mobile equipment may be arranged to contain the HLR function for the Virtual Mobile numbers to be used, may implement a Location Update technique using an HLR function in B's network, or may implement an HLR function for specific number ranges such as service numbers. If it is desired to implement the invention in network A solely with virtual numbers belonging to network A then either technique may be used. If it is intended to operate the Virtual Mobile equipment in Network A on behalf of network B using virtual numbers from B's number range, then the Location Update method must be used.

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In the following example, the Location update method is used, allowing the virtual numbers used to belong to any network, including network A, though in the example they are assumed to belong to network B so that the example has the most general applicability, i.e. network A and network B may be the same network, or different networks.

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In order to implement the invention, the Virtual Mobile equipment is configured so that for selected virtual numbers or number ranges belonging to network B, periodic location update messages are generated by the Virtual Mobile equipment. These cause the location of these virtual numbers as recorded by network B's HLR to be the SMS Router(s) that form part of the Virtual Mobile equipment in network A. Messages directed to these virtual numbers will then ultimately be routed to the identified equipment in network A. Network A can then implement Virtual Mobile services on behalf of network B with no changes to B's network. It is merely necessary for network B to allocate suitable numbers or number ranges and to provision them onto its HLR(s) is the usual way as for new mobile phones, such that location update messages will be accepted in the normal way.

When a mobile subscriber sends a text message to one of the Virtual Mobile numbers associated with network B, his SMSC sends an SRI-SM query that is routed by GSM networks to network B's HLR. The response to this query directs the SMSC to deliver the message to the SMS Router in network A. The Virtual Mobile equipment may then determine that the Virtual Mobile number used is associated with network B, since a network B IMSI is present in the MAP message, and convert the message to an email format and deliver it via an email gateway (18). The Virtual Mobile equipment may maintain a database or lookup table relating Virtual Mobile numbers to IMSIs and to email addresses.

It may be further arranged that voice calls directed to one of these virtual numbers are directed to suitable voice equipment in the following manner. When a voice call is made from any network to one of the Virtual numbers associated with network B, an ISUP voice call is routed in the normal manner to arrive at a gateway MSC in network B. This switch then makes an SRI (Send Routing Information) query to network B's HLR. However due to the location updates done by the Virtual Mobile equipment in network A, a PRN (provide roaming number) request will be sent from the HLR to the SMS Router in network A. Network A's Virtual Mobile equipment is operable to allow it to respond to such requests with the MSISDN or directory number of the suitable voice equipment, which is preferably in network A. Network A is then able to

handle voice calls to these virtual numbers on behalf of network B, for example to provide announcements, or interactive voice services. Suitable voice equipment would be a Voice Services switch or an IVR (Interactive Voice Response) unit. Preferably the voice equipment is able to record messages from the caller and deliver them by email  
5 as an attachment to the email address that is associated with the Virtual Mobile number used by the caller, or optionally to route a call directly to a destination telephone number associated with the Virtual Mobile number dialled by the caller according to for example time of day or other criterion configured on the system.

10 Preferably the voice services equipment is configured to record voice audio files in a widely used, compressed audio format such as GSM, so that it may be decompressed on a wide range of computer equipment running standard email client software. The compression of the audio yields benefits in storage space required for messages on email systems, and for efficient transmission between subsystems within the mobile  
15 and email networks.

Preferably the voice equipment is operable to accept via the email gateway, subject to normal security procedures, an audio file that is to be used as the audio prompt to be played to voice callers to the service. In this way, the organisation may update its  
20 audio prompt by simply sending an email containing the appropriate audio attachment.

Preferably the voice equipment is able to detect DTMF tones entered by the user, for example from his telephone keypad, and to convert these digits into an email message. The option of whether to make a voice recording, to collect digits, or to do both, may  
25 be specified by the service logic of the Voice Services equipment, and may for example be controlled wholly or in part by the dialled number or using other criteria. The resultant information is then converted to email and sent to the associated email address. Advantageously, the email message format for sending received DTMF digits to the associated email address may be the same or similar format to that used for  
30 sending a received SMS message to the associated email address. This then permits combined processing of the messages from the two types of source.

Traditionally, Virtual Mobile implementations direct text messages via Service Providers attached to SMSCs. With the present invention both voice and text messages may be directed preferably to the same destination, which might not be Service Provider, but may be the end-customer or organisation. The voice services equipment  
5 may optionally be configured to route calls through directly during certain hours or to record and email voice messages at other times, and these redirection options are preferably configurable by the end user.

The key advantage of the invention over the prior art is that connectivity is increased.  
10 Organisations may now publish just one contact number through which they may receive voice, DTMF and text message communications. With this invention, organisations that wish to receive text communication no longer need a dedicated connection to a mobile operator, for example by X.25 or TCP/IP that they must rent. Instead they can now opt to receive messages by email, and hence make use of the  
15 email facility that they probably already have at no additional cost. Furthermore the same medium can be used to receive recorded voice calls as file attachments. This has an advantage over traditional answering machine and call recording schemes in that the emailed file may be readily archived or forwarded using normal email handling techniques.

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Preferably the organisation or individual whose email address is associated with the Virtual Mobile number is able to self-provision the email address, i.e. to have control of the set-up of the association without recourse to the network operator. This may be achieved by for example sending a text message to the virtual mobile number from a  
25 specific CLI, where the content of the text message conforms to a predefined syntax that specifies the email address. Alternatively a voice call could be used, with DTMF detection used to transmit a predefined character coding to specify the email address. Other methods are possible.

30 The network operator may wish to provide default email addresses for certain users in advance of those users possibly specifying their own chosen email addresses.

Whilst mobile telephone addresses are customarily associated with individuals, it is not customary for mobile telephone addresses to be associated with organisations or companies. Instead these tend to rely on fixed telephone numbers or email addresses for outside contact. It is possible by addition of suitable infrastructure to the fixed  
5 network to implement this invention also for fixed network virtual numbers.

Class of service, for example controlling the activation or additional features of the present invention, could be determined according to the CLI of the caller, permitting subscription based services based on the invention to be offered only to certain  
10 subscribers.

**CLAIMS**

1. Telecommunications services apparatus for use with a telecommunications system, the apparatus being operable to associate an email address with a mobile telephony address, the apparatus comprising means enabling a communication from a caller to a mobile telephony address to be delivered by email to the associated email address, and means for detecting DTMF tones in the communication entered by the caller and for converting the DTMF tones into email form for delivery by email, wherein the mobile telephony address is a virtual mobile address.
2. Apparatus according to claim 1, including storage means for storing mobile telephony addresses and corresponding email addresses.
3. Apparatus according to claim 2, wherein the storage means also stores corresponding international mobile subscriber identifiers (IMSI).
4. Apparatus according to claim 1, claim 2 or claim 3, wherein the communication is a voice call, and the communication enabling means is operable to record a message that is deliverable as an email attachment to the associated email address.
5. Apparatus according to claim 4, wherein the communication also includes DTMF tones, and wherein the recorded message and the detected DTMF tones are deliverable as an email attachment to the associated email address.
6. Apparatus according to claim 4 or claim 5, including an interactive voice response unit for recording the voice call.
7. Apparatus according to any one of claims 1 to 6, including means enabling a text message directed to the mobile telephony address to be delivered by email to the associated email address.

8. Apparatus according to any one of claims 1 to 7, including means for generating signals indicative of the location of a virtual mobile address whose number is within a number range associated with another telecommunications network, such that a text message to that virtual mobile address can be routed to the apparatus.

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9. Apparatus according to any one of claims 1 to 8, including virtual mobile equipment for determining which telecommunications network is associated with a particular virtual mobile address.

10 10. Apparatus according to claim 9, wherein the virtual mobile equipment comprises at least one SMS router.

11. Telecommunications services apparatus substantially as herein described with reference to and as illustrated in the accompanying drawing.

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12. A telecommunications services method for use with a telecommunications system, the method associating an email address with a mobile telephony address, the method comprising enabling a communication from a caller to a mobile telephony address to be delivered by email to the associated email address, detecting DTMF  
20 tones in the communication entered by the caller and converting the DTMF tones into email form for delivery by email, wherein the mobile telephony address is a virtual mobile address.

13. A method according to claim 12, including storing mobile telephony addresses  
25 and corresponding email addresses.

14. A method according to claim 13, including also storing corresponding international mobile subscriber identifiers (IMSI).

30 15. A method according to claim 12, claim 13 or claim 14, wherein the communication is a voice call, and including recording a message that is deliverable as an email attachment to the associated email address.

16. A method according to claim 15, wherein the communication also includes DTMF tones, and wherein the recorded message and the detected DTMF tones are deliverable as an email attachment to the associated email address.
- 5
17. A method according to claim 15 or claim 16, including recording the voice call by means of an interactive voice response unit.
18. A method according to any one of claims 12 to 17, including enabling a text  
10 message directed to the mobile telephony address to be delivered by email to the associated email address.
19. A method according to any one of claims 12 to 18, including generating signals  
15 indicative of the location of a virtual mobile address whose number is within a number range associated with another telecommunications network, such that a text message to that virtual mobile address can be routed to the original network.
20. A method according to any one of claims 12 to 19, including virtual mobile  
20 equipment for determining which telecommunications network is associated with a particular virtual mobile address.
21. A method according to claim 20, wherein the virtual mobile equipment comprises at least one SMS router.
- 25 22. A telecommunications services method substantially as herein described with reference to and as illustrated in the accompanying drawing.



INVESTOR IN PEOPLE

**Application No:** GB0307710.4

**Examiner:** Mr Nigel Hall

**Claims searched:** all

**Date of search:** 16 September 2004

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A,E	.	WO2004/064423 A1 (Intellprop)

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>W</sup> :

H4L

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

H04Q

The following online and other databases have been used in the preparation of this search report

Online: EPODOC, WPI, JAPIO